Random Essays Releated to ITOS

Integrated Test & Operations System
$Date: 2006/03/21 16:07:22 $

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Introduction

This document contains essays related to ITOS which we think should be preserved, and which might be useful to ITOS users or developers. They are in no particular order, and cover a variety of topics.

Currently, though, there is only one essay in the collection!

1 Some Lessons Learned, 1998-2002

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>From your message: "Re: Request for Help on an Action Item" of June 3

>>    For flight missions and major instruments going back to the
>>    beginning of 1998 - for each mission or instrument list the
>>    systems (just flight and ground systems not data processing
>>    systems) and any comments, anecdotal will do, about software
>>    successes, failures, or lessons and any notable things you
>>    remember about software.  If you have any reports or raw
>>    material you can send that too.
>>
>>             TRACE (Code S)
>>             WIRE (Code S)
>>             SWAS (Code S)
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We enjoyed a very close relationship with the flight software and hardware developers throughout these missions, and that was crucial to our success. The ground software development team was treated as part of the overall spacecraft development team. We were physically located near the flight software and flight computer developers and so maintained very frequent and informal contacts with them. The ground and flight software teams were able to solve problems together.

This group of missions comprise SMEX mission set #2. There was tremendous commonality and continuity of software, hardware, and personnel throughout these missions and with mission set #1. This also contributed a great deal to mission success.

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>>             ULDB (Code Y)
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This missions used a non-standard command scheme with CCSDS telemetry, which required us to make changes in the ITOS command subsystem. We took the opportunity to broaden the ITOS command capability so it could handle a wide spectrum of non-CCSDS commanding schemes in a general manner, including ULDB commanding and the so-called "raw" commands that even CCSDS-compliant missions often employ.

This mission also required handling of an e-mail command and telemetry link with the balloon craft. It also required an RS-232 serial command link with some specific requirements for controlling the hardware handshaking lines. We implemented all of these capabilities as general, user-configurable features of ITOS, available to any future mission that might require them.

This has become our normal way of handling change requests: Determine if and how the user's needs can be met through a generalizing or extending of existing capability which results in a more adaptable and useful ground system.

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>>             Triana (Code Y)
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Because of the continuity of development teams from the SMEX missions, and from SMEX-Lite bus development, we had very no serious issues with the ground software on this mission.

ITOS was used to support the development of the two major instruments on this mission, as well as development of the spacecraft: The EPIC, developed by LMSC in Palo Alto, CA;

and the NISTAR, developed by NIST in Gaithersburg, MD. This provided a big advantage to the instrument developers in that they could develop test procedures, telemetry dispplays, and mission database information on the system that would be used for observatory I&T and missions operations. All of that work came with the instrument to the spacecraft team and could be used directly by the test and mission operators.

ITOS also is slated for use in the Triana Science and Operations Center, collecting data for and controlling the science data processing. (The ITOS team is not responsible for the actual science data processing applications themselves.) We had to develop some new applications to control and monitor the the science data processing, but otherwise found ITOS well-suited to this environment. It made technical and financial sense to develop these new applications on the ITOS base, rather than developing an entirely new system from the ground up.

`>>  Swift (Code S)`

ITOS is used to support the development of all Swift instruments and the spacecraft bus. Again, the mission will benefit from the ability to bring instrument test procedures, telemetry displays, and database inputs directly into observatory I&T and mission operations. Instruments are being developed in the UK, Texas, New Mexico, Pennsylvania, and at GSFC; the spacecraft is being developed in Arizona. Our small team has been able to support this arrangement because ITOS is easy to learn and to use, and because the various teams can share information that relates to using ITOS for this mission.

`>>  HESSI`

This was our first experience supplying the system to a mission where all of the action was taking place at very distant locations, and we underestimated the support costs. Our role in this mission was as a software supplier: We provided Berkeley with the ITOS itself and with support for the software.

This mission found several non-standard implementations in ITOS's CCSDS handling, deficiencies in documentation, and some short-sighted designs. These had not come up before because of our close relationship with previous missions we had supported, which we normally view as an unmittigated advantage. Again, we took each issue that came up as an opportunity to improve the system, and look on this as a positive experience for the ITOS team because it provided us with a fresh look at our system and it's strengths and weaknesses.